

Green Recovery Technologies, LLC



Company Overview Fall 2014

GRT Proprietary – Distribution Limited to GRT Employees and their Assignees under Contract

GRT's Vision and Mission Statement

Vision

Be a market leader in manufacture of value-added proteins and oils utilizing technology to achieve traditionally difficult separations in an environmentally-responsible manner

Mission

To introduce high quality proteins and oils to the aquaculture and biodiesel markets, employing a cost effective extraction technology

*GRT Pretreatment &
Separation Technology*



*Biomass Supply
Agreements*

*Finished Goods
Sales Agreements*

GRT Background

- 2012 spent performing foundational R&D, risk reduction, intellectual property development, recruiting key personnel and memorializing supply chain agreements
- 2013 spent designing an extraction facility in New Castle, DE and identifying and configuring a portable thermal desorber to dehydrate biomass at vendor locations
- 2014 spent constructing an extraction system at an existing facility in New Castle, DE and identifying and configuring a portable thermal desorber to dehydrate biomass at vendor locations
- A group of Delaware-based individuals have funded the project

GRT EcoSep™ Process

- GRT's process involves the extraction of oil, protein and residual water that is in the raw material feedstock utilizing liquefied gases
 - Feedstock is a purchased livestock feed supplement manufactured by a company in Virginia and North Carolina. The material is bio-inactive and free of biological contaminants. Feedstock deliveries amount to 2 trucks per day.
 - The liquefied gas is dimethyl ether (DME)
- GRT's initial operating capability (IOC) is capable of converting 2.10T per hour of feedstock into 2.06T per hour of useful feed ingredients
- GRT's pretreatment and separation process allows for:
 - 98.00% recovery of high quality proteins and oils from the raw material
 - 99.50% solvent recovery, yielding unmeasurable residual solvent in products

GRT's Process Is Inherently Safe and Environmentally Responsible

- Significant CAPEX investment has been made in the:
 - Solvent recovery system
 - Automated gas detection and shutoff
 - Integrated fire detection, monitoring and suppression system
- Utilize 1 ton sealed bins for receiving feedstock and this material is transferred directly into the closed processing system, so there are not odor issues



GRT's Process Is Inherently Safe and Environmentally Responsible

- Have contingency plans in place for delayed shipments so as not to allow raw material or finished goods to accrue onsite



- All dewatering done offsite in the Carolinas, so no wastewater treatment needed in New Castle



GRT's Process Is Inherently Safe and Environmentally Responsible

- All interior work involves a Class I Div II processing area with air turnover that exceeds code by a factor of 5x
- This is to maintain a safe environment for workers, as well as keep any gas below the explosion limits



Summary of NEC Class I, II, III Hazardous Locations (Information from OSHA Website)			
CLASSES	GROUPS	DIVISIONS	
		1	2
Class I Gases, vapors, and liquids (Art. 501)	A: Acetylene B: Hydrogen, etc. C: Ether, etc. D: Hydrocarbons, fuels, solvents, etc.	Normally explosive and hazardous	Not normally present in an explosive concentration (but may accidentally exist)
Class II Dusts (Art. 502)	E: Metal dusts (conductive,* and explosive) F: Carbon dusts (some are conductive,* and all are explosive) G: Flour, starch, grain, combustible plastic or chemical dust (explosive)	Ignitable quantities of dust normally are or may be in suspension, or conductive dust may be present	Dust not normally suspended in an ignitable concentration (but may accidentally exist). Dust layers are present.
Class III Fibers and flyings (Art. 503)	Textiles, wood-working, etc. (easily ignitable, but not likely to be explosive)	Handled or used in manufacturing	Stored or handled in storage (exclusive of manufacturing)

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Production Readiness

- Although GRT has not operated the plant, the plant's design and construction has been reviewed, approved, inspected and/or permitted by the following agencies:
 - New Castle County
 - Land Use (approved)
 - Office of Inspections (permit received)
 - Fire Marshall (multiple permits received)
 - Office of Construction Including Concrete and Foundations (multiple permits received)
 - Electrical (multiple permits received)
 - Plumbing (permit received)
 - State of Delaware
 - Engineering and Compliance Section, Division of Air Quality (reviewed, approved)
 - Area Source Program, Division of Air Quality (reviewed, approved)
 - Ground Water Discharges Section (GWDS), Division of Water (reviewed, approved)
 - Solid and Hazardous Waste Management Section, Division of Waste and Hazardous Substances (reviewed, pending CZA outcome)
 - Tank Management Branch, Division of Waste and Hazardous Substances (inspected and permitted)
 - Boiler Safety, Division of Waste and Hazardous Substances (inspected and permitted)

Dimethyl Ether (DME)

-A clean, colorless gas that is easy to liquefy and transport. Chemically speaking, DME is the simplest ether compound, with a chemical formula of C_2H_6O

-DME has been used for decades in the personal care industry (as an environmentally benign propellant in aerosols), as DME is non-toxic and is easily degraded in the troposphere

-At standard temperature and pressure DME is a gas, but can be liquefied under a moderate pressure. This makes DME quite similar to propane and liquefied petroleum gas.

-In the case of DME, there are no concerns with regard to human or animal exposure.

-DME was first used as an aerosol propellant because of its environmentally benign

-It is not harmful to the ozone layer, unlike the CFCs that it replaced

-DME producer DuPont Fluorochemicals (which markets DME under the product name "Dymel A"), provides a technical bulletin that gives a good overview of the physical and chemical properties of DME, and the results of their own health and safety studies:

"A two-year inhalation study and carcinogenicity bioassay at exposure levels of up to 20,000 ppm showed no compound-related effects..., no signs of carcinogenicity..., and no evidence of mutagenicity or teratogenicity in separate reproductive studies. Based on all these studies, the product have been approved by the Dupont Company for general aerosol use, including in personal products."

Source: International DME Association <http://www.aboutdme.org/index.asp?sid=1>